REMARKS

In the Office Action dated May 3, 2007, the Examiner rejected claim 1-35 and 42-44 under 35 USC §103(a) as being unpatentable over the Thompson U.S. Patent No. 6,539,253. Reconsideration of the claim rejection is respectfully requested in view of the foregoing claim amendments and the following arguments for allowance.

Claims 1-17

By the present response, independent claim 1 has been amended to more specifically indicate that the monitor required by claim 1 is separate from the implantable medical device and has a plurality of ECG leads. The monitor further includes processing circuitry configured to detect a radio frequency artifact from the stimulus generated by the implantable medical device in order to eliminate an occurrence of falsely identifying voltage artifacts from one or more of the ECG leads as a heart beats. As described in the specification and now required by claim 1, the monitor is separate from the implantable medical device and is operable to detect a radio frequency artifact that is a result of a stimulus signal generated by the implantable medical device. The ability of the monitor to sense a radio frequency artifact that corresponds to the stimulus generated by the implantable medical device allows the monitor to correlate the detection of radio frequency artifacts to signals received by the monitor from the plurality of ECG leads.

The Thompson '253 reference cited by the Examiner is directed to an implantable medical device (IMD), such as an implantable cardioverter-defibrillator (ICD) or some other type of implantable medical device, such as a hemodynamic monitor or an implantable EGM monitor for recording the cardiac electrogram from electrodes remote from the heart (See col. 11, lines 53-63). However, the Thompson '253 reference clearly indicates that the IMD 100 is the implantable medical device, whether the medical device is an ICD or another type of monitoring device.

By the present response, claim 1 has been amended to clearly indicate that the monitor is separate from the implantable medical device and includes separate processing circuitry that is configured to detect a radio frequency artifact that results from the

stimulus generated by the implantable medical device. The separation of the monitor from the implantable medical device, as required by claim 1, allows the monitoring system to be used with a previously installed implantable medical device that may be already within a patient. Thus, the separation of the monitor from the implantable medical device allows the monitor to be utilized in previously treated patients that may already include an implantable medical device. To the contrary, the Thompson '253 reference only teaches an implantable medical device that can be used to provide stimulus to the patient. The Thompson '253 reference does not teach or suggest any type of monitor separate from the implantable medical device that can detect a radio frequency artifact created by the stimulus of the implantable medical device, as required by claim 1.

In referring to the Thompson '253 reference, the Examiner cited col. 3, lines 9-30 as teaching that the IMD is able to detect an excessive amount of noise, such as from a metal detector, and operate the IMD in a "reversion mode" such that the device will cause no harm to the patient. Further, the Examiner correctly indicted that the IMD 100 taught by the Thompson '253 reference can communicate by an RF transmission 20 to an external programmer such that information can be relayed to the IMD once the IMD is positioned within the patient's body.

The RF communication between an external programmer 26 and the implanted IMD is significantly different than the ability of the monitor, as required by claim 1, to detect radio frequency artifacts from the stimulus generated by the implantable medical device in order to eliminate an occurrence of a falsely identifying voltage artifact sensed by one or more of the ECG leads as a heartbeat. Claim 1 clearly requires the monitor to detect radio frequency artifacts generated by the implantable medical device that result from the stimulation created by the implanted medical device during treatment of the patient. The Thompson '253 reference only teaches the ability of the implantable medical device to receive and transmit instructions/information to an external programmer through an RF transmission. There is no teaching or suggestion of providing a monitor to

detect radio frequency artifacts from stimulus of the implantable medical device, as required by independent claim 1.

For at least these reasons, independent claim 1 is believed to be allowable over the Thompson '253 reference cited by the Examiner. Claims 2-17 depend directly or indirectly from independent claim 1 and are thus believed to be allowable based upon the above arguments for allowance, as well as in view of the subject matter of each claim.

Claims 18-23

Independent claim 18 was also rejected under §103 based upon the Thompson '253 reference. By the present response, independent claim 18 has been amended to more specifically define the monitor and processing circuitry required by the claim. Specifically, claim 18 has been amended to indicate that the monitor is positionable external to the patient and is configured to detect a radio frequency artifact resulting from a stimulus generated by the implantable medical device positioned within a patient. The monitoring system further includes processing circuitry configured to process the radio frequency artifact created by the stimulus from the implantable medical device in order to determine where the radio frequency artifact occurs in an ECG and identify heartbeats that are paced and heartbeats that are not paced and occurrences of pacing that fail to stimulate a heartbeat.

As described previously, the Thompson '253 reference is directed to an implantable medical device that can receive programming information from an external programmer. The Thompson '253 reference does not teach or suggest a monitor that is configured to detect a radio frequency artifact resulting from a stimulus generated by the implantable medical device, as was clearly set forth in the arguments for allowance of independent claim 1.

Further, claim 8 requires the processing circuitry to determine where the radio frequency artifact occurred in an ECG and identify heartbeats that are paced and heartbeats that are not paced and occurrences of pacing that fail to stimulate a heartbeat. There is no discussion, teaching or suggestion of correlating the detected radio frequency

artifacts with an ECG signal and identifying heartbeats that are paced and heartbeats that are not paced in the Thompson '253 reference. Instead, the Thompson '253 reference teaches that the IMD 100 could be either a pacemaking device or a monitor that records cardiac electrogram information from electrodes remote to the heart. There is no teaching or suggestion in the Thompson '253 reference of correlating sensed radio frequency artifacts with an ECG signal and identifying heartbeats that are paced and heartbeats that are not paced, as is clearly required by claim 18. Although the Thompson '253 reference teaches some type of radio frequency communication to an external programmer, there is no teaching or suggestion of utilizing the external programmer to function as the monitor required by claim 18. Further, there is no teaching or suggestion of including processing circuitry that carries out the functions required by claim 18. For at least these reasons, independent claim 18 is believed to be allowable over the cited reference.

Claims 19-23 depend directly or indirectly from independent claim 18 and are thus believed to be allowable based upon the above arguments for allowance as well as in view of the subject matter of each claim.

Claims 25-35

In the Office Action, independent claim 25 was also rejected under §103 based upon the Thompson '253 reference. By the present response, independent claim 25 has been amended to indicate that the circuit for processing voltage artifacts includes a slew limit circuit to limit pace artifact energy in sensed voltage signals from a patient and a tunable band path filter that is operable in parallel to the slew limit circuit and configured to isolate the voltage artifact form ambient noise and heart signals in the voltage signals. Thus, the circuit is able to provide parallel processing by utilizing both a slew limit circuit and a tunable band path filter for processing voltage artifacts that are created by a stimulus generated by an implantable pacemaker. There is no teaching or suggestion anywhere in the Thompson '253 reference of utilizing both a slew limit circuit to limit pace artifact energy in sensed voltage signals while at the same time providing a tunable band path filter to isolate the voltage artifacts from ambient noise and heart signals.

In the Office Action, the Examiner stated that the Thompson '253 reference taught that while IMD sensing amplifiers are capable of filtering to attenuate noise superimposed on a cardiac signal, in some situations the noise component may be such that filters cannot adequately eliminate the noise. Although the Thompson '253 reference makes statements to that effect, the Thompson '253 reference does not provide any teaching or suggestion of utilizing both a slew limit circuit to limit pace artifact energy and a tunable band path filter to isolate the voltage artifact from ambient noise and heart signals, as required by claim 25. For this reason, independent claim 25 is believed to be allowable over the subject matter cited by the Examiner in the Office Action.

Claims 26-35 depend directly or indirectly from independent claim 25 and are thus believed to be allowable based upon the above arguments for allowance as well as in view of the subject matter of each claim.

Dependent claim 33 further requires the circuit of claim 25 to be configured to process radio frequency artifacts created by the generation of stimulus by the implantable pacemaker device in order to identify where pacing stimulus artifacts occur in an ECG and determine which heartbeats are paced and which heartbeats are not paced and the occurrences of pacing that fail to stimulate a heart beat. As discussed above in the arguments for allowance of claim 18, the Thompson '253 reference clearly does not provide any teaching or suggestion of operating a circuit to perform these functions. Thus, dependent claim 33 clearly presents allowable subject matter.

Claims 42-44

Independent claim 42 was also rejected under §103 based upon the Thompson '253 reference. By the present response, claim 42 has been amended to indicate that the system requires means that are positioned external to the patient for detecting a radio frequency artifact created by the implantable medical device upon generation of a stimulus to the patient. The system further includes means for processing the detected radio frequency artifacts in order to determine where the radio frequency artifact occurs in an ECG and to identify heartbeats that are paced and heartbeats that are not paced and

whether the generation of stimuli failed to stimulate a heartbeat. As described above in the arguments for allowance of claims 1 and 18, the Thompson '253 reference clearly does not teach or suggest means that are separate from the implantable medical device for detecting radio frequency artifacts created by the implantable medical device and means for processing the radio frequency artifact to determine where the radio frequency artifact occurs in an ECG to identify heartbeats that are paced and heartbeats that are not paced. The Thompson '253 reference is directed only to an implantable medical device and does not teach or suggest any type of monitoring or processing circuitry that can detect radio frequency artifacts generated by the implantable medical device when pacing a patient.

For these reasons, independent claim 42 is believed to be allowable over the Thompson '253 reference. Claims 43 and 44 depend directly or indirectly from claim 42 and are also believed to be allowable based upon the above arguments for allowance, as well as in view of the subject matter of each claim.

Conclusion

Based upon the claim amendments and the above arguments for allowance, claims 1-23, 25-35 and 42-44 are believed to be in condition for allowance. The Examiner is invited to contact the applicant's undersigned attorney with any questions or comments, or to otherwise facilitate prosecution of the present application.

Respectfully submitted,

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